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# How to Grow Corn

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# How to Grow Corn

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**A lot of things can make the difference between a good and a poor corn crop. Some you can control—others you can't. Here's a roundup of present "know-how" about the factors you can control.**

SEVERAL things can mean the difference between a good corn crop and a poor one. You can't control some of them. Weather is the most important factor you can't control. But you do have some control over all of the following:

- Date of planting
- Rate of planting
- Use of fertilizer
- Varieties
- Seedbed preparation and cultivation
- Rotations
- Disease and insect control

It has been estimated that with average weather conditions corn yields in Iowa can be increased an average of 25 to 30 bushels per acre by employing the "know-how" already available on growing corn. Here's a brief round-up of that "know-how."

## Date of Planting

Can we reduce corn borer damage by late planting? Since 1944 the Iowa Agricultural Experiment Station and the Regional Corn Borer Research Laboratory at Ankeny have planted 10 corn hybrids at four dates of planting (see chart).

Yields show quite definitely that losses from planting as late as May 26 are greater than any differences in yield because of corn borer damage. Average moisture content, average date of planting and yield in bushels per acre for the 6-year period were as follows:

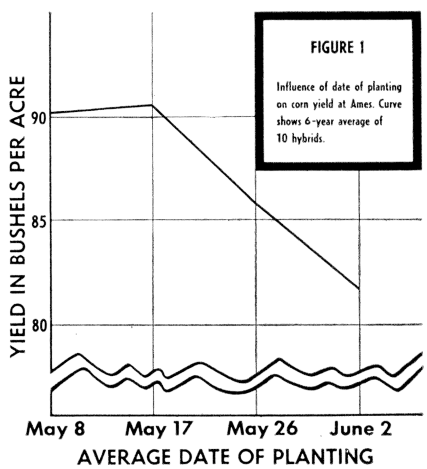


**FIGURE 1**

Influence of date of planting on corn yield at Ames. Curve shows 6-year average of 10 hybrids.

| Planting date | May 8 | May 17 | May 26 | June 2 |
|---|---|---|---|---|
| Percent moisture | 18.5 | 19.7 | 21.4 | 23.0 |
| Yield (bu./A.) | 90.3 | 90.5 | 85.8 | 81.8 |

Date of planting for highest yields in Iowa is limited to about 2 weeks—between May 5 and May 20. This fact already is recognized by many Iowa farmers. Driving through the state in early May, you'll not only see tractors out in the fields during the day but also on into the night long after sundown.

To get the job of planting done in time, farmers have found that it pays in higher yields to work day and night to get their corn planted during the best planting dates. Farmers may seem "over-invested" in machinery to take care of this rush period. But if this investment results in greater timeliness of planting, it probably is a good investment.

## Rate of Planting

More stalks per acre than most Iowa farmers have in their fields give higher yields at little extra cost. But the soil must be fertile for the higher rates of planting.

On above-average Iowa soils or on average soils with proper use of recommended fertilizers, an optimum stand at harvest should be 13,000 to 14,000 stalks per acre. With an average survival of about 80 percent of the kernels planted, this calls for an average of 4 to 5 kernels per hill placed 40 inches each way to get such a final stand.

For top yields with heavier stands, it's best to narrow the rows or hill spacing rather than to plant more than four kernels per hill. Many farmers are narrowing their rows to a 38-inch spacing and power dropping hills much closer.

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For example, three kernels per hill, 28 inches apart, in rows 38 inches apart would result in a stand of about 15,000 stalks at harvest. And on top Iowa soils or with liberal use of fertilizer, stands of 15,000 to 16,000 stalks will give highest yields.

A summary of experiments since 1945 with rate of planting combined with use of fertilizers shows:

—A final stand of four stalks per hill in 40 by 40 inch checked corn (15,700 stalks per acre) gave maximum yields with the best fertilizer treatments. (It's necessary under average conditions to plant five kernels to have an average of four stalks at harvest.)

—Average yields from different stands at harvest with and without moderate to heavy fertilizer applications in nine experiments with 40 by 40 inch spacing have been:

| | *Stand at Harvest* | | |
|---|---|---|---|
| Stalks per hill | Stalks per acre | Yield without fertilizer | Yield with fertilizer |
| 2 | 8,150 | 60.5 | 73.5 |
| 3 | 11,570 | 68 | 83.5 |
| 4 | 15,020 | 69.5 | 89.5 |

—On five experiments where the final stand was increased from 15,500 stalks per acre (about four per hill) to 18,700 per acre (near five per hill), yields were decreased 8 bushels when unfertilized and 3 bushels when fertilized.

—Efficiency of fertilizer use along with other good soil management practices increases when the stand is adequate. *Increased stand levels and increased soil fertility must be considered together for top yields.*

The main advantage of checkrowing or hill spacing corn planting is in weed control by cross cultivation. Drilling and power checking saves time during planting, and the job of resetting the check wire is eliminated.

## Fertilizer for Corn

Use of commercial fertilizer on Iowa soils has increased greatly over the past 10 years. Farmers are becoming more aware of the possibilities of increased crop yields from the use of fertilizer. Besides starter fertilizer applied at planting time, plowing under or side-dressing fertilizer has been profitable.

Soils differ so greatly in their needs for fertilizer that no general recommendation is just right for all soils. A soil test for acidity, phosphorus and potassium is a definite help in figuring out needs for lime, phosphate and potash. To determine nitrogen needs, it's necessary to consider the type of soil, cropping history and frequency of legumes in the rotation, amounts of manure and fertilizers recently applied, and crop yields. If you've noticed nitrogen starvation symptoms on previous crops it's likely that your soil needs nitrogen.

**Starter Fertilizer:** Starter fertilizer is applied at planting time with a planter attachment. In most areas of Iowa, the starter fertilizer should be a complete mixture such as 4-16-8 or 3-12-12. In western Iowa where soil tests indicate enough available potash, the starter fertilizer usually is 6-24-0, 10-20-0 or similar mixtures containing only nitrogen and phosphate.

Starter fertilizer alone, however, isn't enough on many Iowa soils. Starter fertilizers give yield increases averaging 6 to 10 bushels per acre. Usual rate of application is from 100 to 175 pounds per acre. Because of placement near the hill or row, heavier applications may reduce germination.

**Side-Dressing, Plowing Under:** Where soil tests indicate low or very low phosphorus or potash or where history of the field indicates need for more nitrogen than can be applied with a planter attachment, extra amounts can be put on in several ways.

All three elements may be broadcast before plowing, or they may be broadcast and disked in just ahead of the planter.

Nitrogen and potash may be broadcast in the corn when small or may be side-dressed with a fertilizer attachment on the cultivator —preferably at the time of the second or third cultivation. Potash is only about half as effective if broadcast, therefore much larger amounts are needed if this method is used. Side-dressed applications of 33-0-0 applied at rates of 60, 120 and 240 pounds per acre have given average yield responses of 11, 16 and 21 bushels per acre respectively. Plowing under nitrogen at the same rates gives equally good results.

## Varieties

On the whole, Iowa farmers are doing a good job in selecting and planting the better-performing hybrid varieties, although this wasn't true several years back. At present, according to the Iowa Corn Yield Test Bulletin, the performance of the widely-grown hybrids compare favorably with the average performance for all hybrids in each section.

The question of planting late or early varieties depends upon the date of planting, killing frost date, fertility level of the soil and fertilizer treatments used. Late varieties should be planted first, choosing earlier-maturing varieties as the planting date nears June 1.

Varieties on the late side in maturity usually outyield early varieties and also stand better at harvest. Losses from an early frost and soft corn may not be quite as serious a problem on farms with a heavy livestock program as on farms with few livestock. Soft corn may be fed to livestock early after harvest thus reducing the risk of loss through spoilage.

The farther north we go in Iowa, the more carefully do we need to be sure that a hybrid is early enough to be reasonably mature in a majority of seasons and still yield relatively well. As we move south, the maturity must be later or we sacrifice in yields.

## Preparing Seedbed

For the past 10 years we've heard various views as to the best methods of seedbed preparation for corn. Some criticism has been directed at large soil losses resulting from plowing, disking and clean cultivation that leaves the soil unprotected from wind and water erosion.

However, except for a few areas in western and southwestern Iowa where listing is widely practiced, nearly all our corn land is plowed in fall or spring, disked thoroughly and harrowed just before planting, followed by clean cultivation after planting.

The Iowa Agricultural Experiment Station has been trying different methods of seedbed preparation for the past 8 years. An easy answer hasn't yet come up. Until

better methods are worked out, the usual method of plowing, disking, harrowing and surface planting probably is as good an answer as we have on corn following sod crops or on heavy textured, slowly-drained soils.

Working soil when it's wet breaks down its structure and causes it to "puddle" or run together and bake on drying out. This breaks down the soil structure and reduces air space in the soil, reduces release of soil nutrients and reduces the water-holding capacity of the soil. Corn in a field that has been worked when too wet will be stunted and turn yellow.

**Fall or Spring Plowing?** Slowly-drained, heavy-textured and level soils such as Webster silty clay loam often are too wet in the spring and should be plowed in the fall. Winter freezing and thawing of these heavy-textured soils in their plowed condition improves soil structure. Lighter textured, better-drained and sloping soils where there's greatest danger of wind and water erosion should be spring plowed.

**Depth of Plowing:** College tests and farm practice generally have shown that plowing about 5 to 7 inches deep gives better results than shallower depths. But usually there's no increase in yield from plowing deeper than 7 inches.

## Weed Control

Although weeds may be beneficial in prevention of soil erosion, they also compete with corn for moisture and nutrients. Weedy corn usually shows definite symptoms of nitrogen starvation—light green color and slow growth. Both chemical and cultural means are available for controlling weeds.

Many weeds can be killed before planting by having the ground plowed a week or two before planting time, allowing weeds to germinate. Then they'll be killed by disking and harrowing just ahead of planting.

The harrow, weeder and rotary hoe can be used successfully in destroying small weed seedlings before cultivation. This can be done before the corn is out of the ground or after the corn is 3 to 4 inches tall—even taller if a weeder or rotary hoe is used.

The main purpose of cultivation is weed control. On soils in good physical condition, yields would probably be high without cultivation if the field were free of weeds. But on many soils that run together when wet and crust and bake on drying out, cultivation does increase aeration and water intake. Cultivation should be shallow. Corn root "pruning" cuts yields.

## Rotations

A good crop rotation including a legume will increase crop yields and total production over that obtained when grain crops are grown without a legume.

A crop rotation is important whether you are an owner-operator, a landlord or a tenant with a long- or short-term lease. The one consideration is that enough time be allowed to get full benefits from the legume in the rotation. Changing from a grain cropping system to a rotation including legumes will take 1 to 3 or more years before full benefits are received. But there are short cuts which permit relatively quick benefits—such as seeding a legume in small grain to be plowed under as a green manure crop for corn. This requires but 1 year.

A good crop rotation . . .

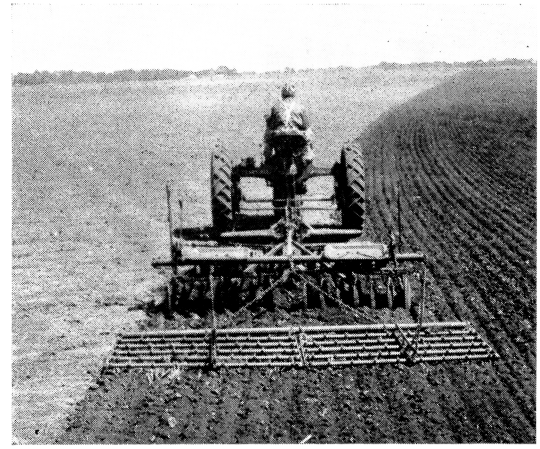
- Increases crop yields by improving soil fertility, improving soil structure and tilth, helping control erosion, weeds and certain crop pests and diseases.
- Distributes labor more uniformly during the year.
- Fits in with a livestock program.

## Pest Control

Corn borers have taken a heavy toll in some Iowa cornfields. While insecticides are our most effective method of control, they won't solve all problems of control alone. Sanitation such as clean plowing, favorable planting dates and strong-stalked hybrids will help. (For details about using insecticides, see Pamphlet 176, available at your county extension office.)

Recent tests indicate that it may be practical to control corn rootworms by chemical insecticides. (See "Fighting the Corn Rootworm" in the February 1952 issue of IOWA FARM SCIENCE.)

**The Agricultural Experiment Station at Iowa State College has been trying different methods of seedbed . . .**



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